

Special Report

OF THE

STATE ENGINEER,

ON THE

SYSTEM OF INTERNAL IMPROVEMENTS,

TO THE

LEGISLATURE OF THE STATE OF LOUISIANA.

---

BATON ROUGE.

PRINTED AT THE OFFICE OF THE DAILY ADVOCATE.

1857.

# Special Report

OF THE

STATE ENGINEER,

ON THE

SYSTEM OF INTERNAL IMPROVEMENTS,

TO THE

LEGISLATURE OF THE STATE OF LOUISIANA.

---

BATON ROUGE.

PRINTED AT THE OFFICE OF THE DAILY ADVOCATE.

1857.

## Special Report on Internal Improvements.

---

*To the Honorable the Senate,  
and House of Representatives :*

At the last session of your honorable bodies, you adopted the following

“JOINT RESOLUTION,

Instructing the State Engineer to report to the Legislature, at its next session, a system of Internal Improvements.

“*Whereas*, Great losses are sustained by the planters of this State yearly, by overflows; and, *whereas*, the danger is yearly increasing; therefore,

“*Be it resolved by the Senate and House of Representatives of the State of Louisiana, in General Assembly convened*, That the State Engineer be, and he is hereby instructed to examine and report to this Legislature, at its next session, a complete system of Internal Improvements; that he devote his particular attention to the expediency and practicability of reducing the Mississippi to its natural banks.

“*Be it further resolved, &c.*, That the State Engineer be instructed to report (should he be of opinion that it is practicable to reduce the Mississippi River to its banks) fully, where, and in what manner, said work should be commenced, and what natural water-courses may be opened and used for the aforesaid purposes.

“*Be it further resolved, &c.*, That said State Engineer be instructed to report fully, plans and surveys, in support of such system as he may in his judgment report, in order that the Legislature may have all necessary light possible on this important subject.” Approved March 20th, 1856.

255489

Your honorable bodies will notice that this Joint Resolution naturally divides itself under four heads, viz :

*First.* Examine and report a complete system of Internal Improvements.

*Second.* The expediency and practicability of reducing the Mississippi to its natural banks at times of floods.

*Third.* If it is practicable to reduce thus the Mississippi to its natural banks, in what manner the object is to be obtained.

*Fourth.* Report fully, plans and surveys in support of the system of Internal Improvements which the State Engineer would deem right to recommend.

It must be acknowledged by all, that under *each one* of these heads there is work enough cut out to occupy the Engineer one entire year ; especially when it is remembered that his office at the State Capitol, the State Library, the archives of every other Department of the State, and also the documents and papers of your honorable Houses, furnish but a very meagre amount of information of the kind needed to establish correct, scientific, and definite opinions and views. Still, there is such a close connection between those heads, and dependence of one on the other, that they form a whole ; and neither could be fully examined or discussed without the information necessary to the whole. And here let me put the question—*What is the information necessary ?* I answer as follows, viz :

*A correct, complete, survey of the State of Louisiana.* And what is meant by a correct, complete survey ? There is meant more than the State has yet achieved, or than anything that has as yet been done. Such a survey calls for an instrumental examination of the entire State, so as to establish the causes of all its streams, the position of all its lakes, swamps, hills, etc., etc. It calls for the running of lines of levels throughout the State, so as to determine the height of hills and ridges, the depth of swamps, lakes, and streams, and the fall of streams and of lands. It calls for a measurement of waters, of currents ; a calculation of amount of sedimentary matter in our running waters. In fine, to sum up in brief, a complete survey of Louisiana would be one made by a scientific corps of engineers, and would be topographical and hydrographical. I must add that such a survey would only be perfect when made geological also.

Now, your honorable bodies are well aware that no such survey has

ever been made of the State. Under the direction of the United States Government, a board of U. S. Topographical Engineers submitted, in January 1851, views as to a proposed survey of the delta of the Mississippi. (See U. S. Senate Doc. 13, Second Session, 31st Congress.) The system of survey thus proposed was immediately prosecuted, under the supervision of one of the same officers. The field operations have been completed, but the office work has not, as yet. From a letter of Capt. A. A. Humphreys, the able officer who directed the field operations, I take the following extracts relative to those operations :

“The Topographical Survey was begun at the mouth of Red River, and, including the upper mouth of Atchafalaya, extends along the west bank of the Mississippi to Baton Rouge. The parties were unable, at the time of the survey, to include the east bank in this distance, on account of high water. From Baton Rouge to New Orleans, the survey covers both banks of the river, extending down to the swamps. Lines of levels were run on each bank, and cross-lines of levels at many points. The survey of the Plaquemine was extended to Indian Village.

“River meters were established at several points above the mouth of Red River—one at the mouth of Red River, one at Baton Rouge, one at Donaldsonville, one at Carrollton, one at Fort St. Philip, one also on Lake Pontchartrain, at the mouth of the new canal, one (for a month) at Proctor's Landing, one in an inlet from the Gulf, near Fort St. Philip—and these three Gulf meters were connected by lines of level with the nearest river meters.

“The stand of the water on these various river meters was observed for two years.

Hydrographical sections of the river were made at the mouth of Red River, and at various points between that and New Orleans; and extensive and careful observations for velocity of current were made at these points. Sections were likewise made of all the bayous leading from the river, between the same points, and similar observations of velocity.”

Capt. Humphreys hopes that he will be allowed to devote his time to complete the plottings of maps, etc., etc., of the survey.

It will be seen that, so far as this survey extends, it will, when completed, give much and very valuable data, upon which we can

base a system of works to prevent the overflows of the Mississippi. Still, so far as the State of Louisiana is concerned, it would be necessary to extend the survey above Red River, and also, by various lines, above those mentioned by Capt. Humphreys, to the Gulf. We have lands that overflow above Red River, and it is necessary to determine if it would not benefit us—as to overflows and drainage—to open other outlets to the Gulf besides the existing ones. The survey, as projected, is good, and of the right description; but it is too limited to determine completely the measures to be adopted in a general system for the entire State of Louisiana.

I have sought elsewhere, and indeed everywhere it could be obtained, for information. I have found much that is valuable in several places; and I would mention here Reports of the old Board of Public Works, Reports of my predecessors in the Engineer Department, Report of the Senate Committee on Levees, etc., in 1850, and Reports of Charles Ellett, Jr., to the United States Bureau of Topographical Engineers. But, at the same time that I found everywhere some valuable information, and many correct views and propositions, all of the surveys and examinations upon which the several documents are based have been too partial, too local, too much appertaining to single and solitary improvements, too disconnected and independent of each other, to allow any one to base, upon such informations, views and propositions, such a system of internal improvements as that which your Joint Resolution seems to require, and as the one I would wish the State to establish.

The next step which my sense of duty directed as the proper one for this Department to take, was to undertake to make a survey of the State; here I was at once made to pause, by the consideration that I was not authorized to undertake such an extensive work, and not authorized to make any expenditures or incur any debts for it. Admonished by the blame which has been cast upon officers and committees heretofore, when they assumed to make unauthorized expenditures in the name of the State, I resolved to profit by the experience taught by past legislation, and appear before you blameless. I have therefore commenced no survey of the State.

In the meantime, wishing to prepare, as far as the means of the Department allowed, the way for such a survey, I have caused maps, on an enlarged scale, and more in detail, to be made of the State, from the township plots of the State Land Office. Those maps,

though certainly very inaccurate, will be of great utility in directing a survey of the State.

I had hoped that, by my efforts during the year, and by assistance from data obtained elsewhere, and especially from data confidently expected from the Bureau of United States Topographical Engineers, to give your honorable bodies at least a partial report, which might have proved satisfactory to you and to myself. This is one reason why, during your last session, I approved of your Joint Resolution; but such was not the only and principal reason of my approval of the measure. The fact is, in my humble opinion, the measure is a move in the right direction. My inability to obey your mandates I certainly regret, but my regret can only be personal to myself; and it only remains for me to say that my firm conviction is, that should the Legislature furnish the Engineer Department with the means necessary to enable it to give a full report, as required by the Joint Resolution, then will be commenced the proper and real improvements demanded by the State of Louisiana. The Resolution, indeed, adopts the system of preliminary surveys and estimates pursued by all States or powers who have prosecuted a successful system of internal improvements, and which has been so long disregarded by Louisiana.

So, then, we have taken one step in the right direction as a State; my failure to report fully does not matter; let the next step be to give the means to carry out the views and aims of the Resolution, and we are safe on the way we should travel.

As, however, it may be deemed incumbent upon me to give my present views as to objects set forth in the Joint Resolution, I will respectfully communicate the following remarks,

#### RELATIVE TO A SYSTEM OF INTERNAL IMPROVEMENTS.

The present internal improvements of the State are carried on by two separate and distinct Departments—that of the Board of Swamp Land Commissioners, and that of the State Engineer. The first have under their entire control the reclamation and drainage of the swamp and overflowed land donated to the State of Louisiana by the United States; and for this purpose have in use such portions of the fund accruing from the sale of said lands as may be yearly appropriated by the Legislature. The State Engineer has in charge the improvement, for navigation purposes, of all the streams of the State, and the construction of public roads for land transportation. The ✓

means at his command are the snag-boats of the State, ninety-four slaves, and such sums as the Legislature appropriates yearly to his Department.

Such is briefly the present organization. The Constitution of the State (Title VII., Articles 130, 1, 2, 3, and 4) apparently has in view the adoption of a totally different organization. Efforts have been made by members of the Legislature heretofore, and are now being repeated, to establish the Board of Public Works contemplated by the above title of the Constitution.

It therefore seems to be here my duty to submit, respectfully, to your honorable bodies, my opinions upon both systems, and to dwell briefly upon the features of all the Acts by which, during the last three years, the second system has been sought to be established.

Allow me to make, first, some general remarks which bear upon the subject. The following proposition is self-evident, viz: *An Internal Improvement Department, however constituted, is, and must be, executive*; this must be admitted. With this as a starting point, the next step is to inquire, What is the first essential requisite for an effective Executive Department? If we look everywhere, we find that it is to have *one single responsible head*; a head who is made as independent, in his sphere of action, as circumstances will permit. Kings and Potentates in Europe, the President of the United States, our State Governors, our Chiefs of Departments in the General Government, and in all the branches of its service, are such heads; all its subject to only such modifications, in their positions, as are necessary to said positions. It must be further admitted, as a second proposition, that *the more responsibility is divided, the weaker it becomes*; this springs from the weakness of human nature; therefore I lay down,

*First.* That the Internal Improvement Department is *executive*.

*Second.* That being executive, its efficiency and success depend upon the existence for it of *one single responsible head*.

I will be pardoned for not entering into an elaborate argument to establish these positions. They must strike every reflective mind as self-evident. I will therefore pass on and make a brief application of them to Title VII. of the Constitution, and at the same time express my views of the different provisions of said Title. Article 130 provides for a Board of Public Works, to consist of four Commissioners. Here is at once a division of functions, a weakening of efficiency, and diminution of responsibility. But as if this was not yet



bad enough, the article goes on to make those Commissioners elective in four different districts ; and, therefore, by bringing about a clashing of sectional interests, still more reduce the efficiency of the system. Is it not evident that four men cannot be held to the same accountability as one ? and is it not also evident, that in a department where prompt decision and untrammelled action are required, that one ruling mind is more efficient than four minds who are embarrassed, retarded, crippled in decision and action, by the difference of opinions, ideas, and wishes of each other ? Is it necessary to answer these questions ? The clashing of interests between four different sections of the State would be a source of great evil, and certainly would create still more disagreement between the members of the Board. In fact, it would be enough to paralyze completely its actions and operations. It would also throw into the Legislature, at every yearly session, a brand of discord. The Constitution directs a division of the State into four districts, containing, as nearly as may be, an equal number of voters. Now the city of New Orleans contains a number of voters which almost entitles it to be a district by itself. Some few of the populous parishes come up with New Orleans in the same category. Now it happens that New Orleans has not much work of internal improvement which is not in the hands of chartered companies, or which would not necessarily and legally belong to the corporation of the city. Many of the parishes which need most improvements are the most sparsely settled. Now how is the Legislature to divide the funds between the four districts ? Let every individual member of your honorable bodies put the question to himself ; and let him settle upon the amount of money he wants for his district. I am afraid he will be wanting more than he will obtain.

The next point is that the Commissioners are elective, each in his district. This still farther goes to divide the Board into four discordant parts, as the manner of their appointment makes them independent of each other ; whereas their duties would require them to be as one mind. Did they owe their appointment to one and the same power, there would certainly be more agreement and more concert of action between them. But a few words as to the making of the Commissioners *elective*. And first, must a Commissioner be an engineer and at the same time a voter and resident in his district, or in the State ? It must be admitted that Louisiana has not had such extensive works of internal improvements achieved as yet to have

formed, even by routine, very numerous and competent engineers. Our present wish to do better in the future is sufficient proof of this. The consequence is that there would be great danger that men should be put in office, not for their competency, but merely for their popularity. For it must be admitted, farther, that engineers, from the nature of their profession and avocations, and from their habits, are by no means fitted to court the good will of the people, and obtain the popular vote. We have the example of all the governments of the civilized world to teach us that we must seek and secure talent wherever it is to be found. When Russia wishes to build her great St. Petersburg and Moscow Railroad, her Emperor sends to America for a Whistler. When she wishes to build her fortifications along the Danube, she calls in French engineers. When France and Germany, and other powers, wish to have competent men to conduct their steam machinery, they send to England. General Bernard, so conspicuous in our national history, and relied upon even in our own State, was a Frenchman. Claudius Crozet, once our State Engineer, now the able State Engineer of Virginia, was a Frenchman. I do not wish it to be understood that I advocate the casting aside of our own engineers, Louisianians or Americans by birth or citizenship; but I wish to impress the necessity of not throwing such impediments in the way of talent as to deprive us of obtaining it when the State needs it. But I have said enough to show that, in my humble opinion, it would be highly detrimental to our interests to make the Commissioners elective. This may appear anti-democratic in the *unlimited* signification of the term democracy; but I am willing to rest under any charge that it may bring upon me. If we are to have a Board of Public Works, let us have the Commissioners appointed by the Governor, subject to the advice and consent of the Senate. The Governor having his reputation and that of his administration at stake, and being well qualified to judge of talents and capacity, would at least give us engineers for Commissioners.

But the different Acts which have been brought before the Legislature during the last few years to establish the Constitutional Board have had, without exception, a feature still more objectionable. They have all proposed to create the office of "Civil Engineer," and all have made this officer elective by the Board. At the same time, they throw upon him functions which he cannot fill without being inde-

pendent of the Board. They make him a mere creature of the Board, dependent upon the good will of the Commissioners, and yet throw upon him a responsibility which the Commissioners alone ought to assume. This is complicating matters, and rendering the system still more cumbrous, inefficient, and inoperative. All other officers are to be likewise appointed by the Board. Here is a new complication and increased difficulty.

Elected for four years, "the Commissioners may be removed by the concurrent vote of a majority of all the members elected to each House of the General Assembly." Does any one expect that he will ever see a Commissioner removed under this clause, however incompetent he may have proved himself?

Why not adopt a system free of all these objections? Make *one Engineer* for the State of Louisiana; give to him the sole control of all the improvements undertaken by the State; hold him responsible for the employment of all sub-officers, their appointment and removal at his will; let him be appointed by the Governor, with the advice and consent of the Senate, for a term of four years, but removal at the will of the Governor; make his salary sufficient to induce him to devote his entire time and labor to his functions; specify these functions, so as to make him collect and keep on record all matters that may benefit the internal improvement department; hold him to a strict accountability for all his disbursements, even by giving bond; let his department decide upon what works shall or shall not be done, and let his estimates and opinions be a guide for legislative action; make him responsible for the proper discharge of his duties, by causing him to endanger, in case of dereliction, his personal interest and reputation. We will thus have an energetic, efficient, and successful system. As a matter of course, sufficient means, pecuniary and otherwise, must be furnished the Engineer.

Such is the system I most earnestly recommend. The present State Engineer Department, with very slight modification, and increased means, will answer every requirement.

So far, I have only considered the two systems, (that contemplated by the Constitution, and the one I recommend), as regards efficiency. I wish to call your attention to the fact that the Constitutional Board would certainly be, by far, more expensive to the State. If we refer to the records of the old Board of Public Works, which formerly ex-

isted here, we will find that their yearly expenditures far exceeded the expenditures of the present department. Not that I consider those expenditures exorbitant—still the comparison is in favor of the present system. In the first place, under the Constitutional Board, we would have a serious expenditure for salaries of officers, as it is not to be denied that no good men would act as Commissioners except at a remunerative price. Again, each district would require and make increased expenses. In fact, I know of but one system which would prove more expensive—it would be the “contract system.” Relative to this last, we have had sufficient experience to admonish us never to resort to it; and I do not consider it necessary to enumerate its numerous and irremediable defects.

In conclusion of this subject of a system, I would say, let us modify (not in its main features, but in some of its minor points) the present system; let us give it boats, tackles, etc., an increased number of slaves; let us give it store-rooms, shops, a ship-yard and a hospital at the seat of Government; let us give it yearly the pecuniary amount necessary to utilize all its resources; then let us compel it to make the survey of the State recommended in this Report. After this is done, Louisiana will begin to be improved and beautified. Any other course, in my opinion, will prove a failure.

#### EXPEDIENCY AND PRACTICABILITY OF REDUCING THE MISSISSIPPI TO ITS NATURAL BANKS IN TIME OF FLOODS.

The discussion of this subject without the data, which can only be furnished by a survey of the entire overflowing portions of the State, may amount to nothing more than to express views founded on conjectures and erroneous premises. I will not pretend to lay claim to originality in my views. Others have entertained them before me, and theories have been given before, which accord with my ideas.

It is acknowledged by all that there was a time when the sea extended over all the country of alluvial formation along the Mississippi, or that at some remote time the Mississippi had its mouth at the head of this alluvial formation, and as it brought down the sediments from the great West, (for I consider the Missouri the main stream), it gradually filled up the sea, and, forming land, finally reached its present mouth. The changes which we know have oc-

curred at the Balize since we have a knowledge of the Mississippi, and the topography and geology of the country, establish this to our satisfaction. Then, in considering the Mississippi, we should start with this as an admitted fact. We should next refer back to the condition of the stream and of the country when the Europeans first explored and settled our lands; and then take in view the changes which have taken place since, either naturally or by the efforts of man.

What was the condition of the Mississippi and the country when first visited by Lasalle? The Mississippi rose annually, and overflowed several large districts of land along its eastern bank down to Baton Rouge, and along its western bank down to Red River, which districts received its waters and retained them as in reservoirs, to discharge them again into the bed of the river when the floods passed off. Below Baton Rouge on the eastern bank, and below Red River on the western bank, the waters passed over the lands, but found their way directly to the Gulf of Mexico and never returned to the river. Let us first consider the Mississippi in its natural state above Baton Rouge and above Red River. The proper point to start from is one above the confluence of the Mississippi and Ohio Rivers at the base of the rock-bound shores called the Big and Little Chains of the Mississippi. Following the eastern bank, we leave the Ohio River, and find that, some eighteen miles below, the Mississippi sweeps along the Iron Banks, the Chalk Banks, Mill's Point, and the first, second, third, and fourth Chickasaw Bluffs. This brings us to the present location of the city of Memphis. A few miles below, we come to the broad, extensive district of alluvial and overflowing lands known by the name of Yazoo Swamps, and through which the Yazoo River and its numerous bayou tributaries run. This district, along the river, is some 400 miles long. At its lower termination, we meet the Walnut Hills, the present location of Vicksburg. Below the Walnut Hills we find intervals between hills, ridges, or cliffs, at the following now named points, viz: at Grand Gulf, Rodney, Natchez, Ellis' Cliffs, Fort Adams, Tunica, Bayou Sara, Port Hudson, and Baton Rouge. We then find that from the mouth of the Ohio, on the eastern bank of the Mississippi, this river, by sweeping the foot of ridges of highlands, divides the alluvial formation into sixteen separate and distinct districts; some of these are of no large extent—that of the Yazoo is very extensive. \*

Let us go to the western bank of the Mississippi. We shall commence again at the Big and Little chains above Cairo, and we shall find a striking difference both in the extent and continuity of the overflowed districts. We meet with no interruption of lowlands, from the chains downwards, until we arrive at the present position of Helena, 370 miles by the course of the river; thus we have a district 370 miles long by the river, and stretching to a width of some 50 miles, and terminated northward or westward by the western slopes of the St. Francis River. The St. Francis and its tributaries pervade this district. From Helena to the mouth of Red River there is a continuous district of lowlands, subject, in a state of nature, to annual overflows. Such we assume to be the condition of alluvial lands above Baton Rouge and Red River. Let us now examine the effect of an overflow of the Mississippi on those lands, (always unprotected by artificial means). The points named as high ridges must be recognized as at all times above any Mississippi waters. The Mississippi commenced filling up the sea, let us admit, at the foot of the Big and Little chains, and filled up the spaces nearest its mouth. Gradually it formed lands in the districts above Helena, and also in the districts nearest the Ohio on the eastern bank. Having filled up two opposite districts to the point of having banks to its newly formed bed through these districts, it began to invade another district, and thus it finally reached, on the western side, the alluvial deposit which likewise the Arkansas and Red Rivers were forming as they brought down the sands of the Great West—uniting with these streams in the work of making lands for the benefit of man, it finally reached, in its labors southward, the last high ridge of Baton Rouge.

Without stopping to reflect here upon the matters here laid down, let us follow the Mississippi southward. On the eastern bank, we find a district from Baton Rouge to the mouth of the river, and terminated eastward by the same highlands of Baton Rouge which run along the margins of Lakes Maurepas and Pontchartrain, and the banks of the Amite River. Thus forming between Baton Rouge, the Amite, Lakes Maurepas and Pontchartrain, and the Gulf, one immense district subject to overflow from the Mississippi. Let us now look to the country on the western banks below Red River.—Here we find a vast district having for its eastern limit the Mississippi down to the Gulf, and for its western limit the Atchafalaya and

its continuation of lakes, bayous, bays, etc., down to the Gulf. Low, flat lands also extend westward of the Atchafalaya. But these, though affected by the overflow of the Mississippi, will not now be taken into consideration; for it may be doubted whether the Mississippi had any thing to do with their formation. We must rather suppose that Red River had most to do with the formation of the alluvial soils west of the Atchafalaya.

Now let us go back and reflect a little. We know that the difference of level between the Mississippi at the mouth of the Ohio, and the Gulf of Mexico at the Balize, is about 275 feet. Admitting that the Mississippi commenced forming land at or near the Ohio, we must see that it there first raised lands above the sea, so that the first section raised must have been at one time coincident with the surface of the Gulf. By annual inundations, it gradually elevated these first lands, whilst constantly pushing southward its inroads upon the bed of the sea. With every advance of new formation in the Gulf we can conceive a corresponding elevation of the soil previously formed. But there was another effect. Of course if the Mississippi once met the sea at the chains, it must have precipitated itself from a height of 275 feet; filling the sea, it finally destroyed this immense cataract, by prolonging its own course and reducing its plain of inclination. To pass from cataracts to an even and smooth flow, it must have gone through every stage of the velocity of waters—from falling waters to mere running waters. Can we not now conceive the Mississippi gradually forming its alluvion, and, by lengthening its course south and diminishing its plain, gradually lessening the velocity of its current? Such would appear to be the plausible theory; now a step farther. Taking the first sea-basin filled above tide-water, and the second basin coincident with it, naturally every rise of the river still continued to overflow the land of the first basin. So, when the the third basin was filled, the first and second continued to be overflowed; and so on in succession with all the basins, all being yearly overflowed and elevated more and more. This has in it nothing surprising; because, as the river lengthened its course the waters rose higher and higher at its different points—otherwise, the alluvial soil near Cairo would not be higher than at the Balize. Again, the rise and fall of the river increases gradually from the Gulf to the Ohio. At New Orleans it is some 15 feet, at Baton Rouge some 32 feet, at Helena about 45



feet, and so on; whereas at the Balize it is very small. In a natural condition, we should therefore understand the Mississippi to have overflowed annually all the lands of its own formation, from the Ohio to the Gulf, and annually to have elevated those lands to an increased height proportionate to the advancement of its mouth into the sea. But these overflows, what were they? Did the waters rise to the depth of several feet above the immediate banks of the stream?—Not at all. They merely skimmed over these banks, and, as they thus escaped, laterally with a diminished velocity of current, deposited their sedimentary matter on those banks or on their outer slopes. Thus the banks were raised higher and higher, and their slopes pushed farther and farther, so as finally to fill up all inner basins or flats.

Such, then, must be our conception of the manner in which the Mississippi formed its immense delta of lands. We are sustained in this theory, by what actually existed when the adventurous Lasalle first descended the mighty river, and when the white race first settled its banks. True, many things go to cast doubt upon this theory; but there is nothing to invalidate it, and which cannot be well explained under it, when we consider that the many singularities of the topography of the Mississippi Valley can easily be accounted for by supposing very accidental causes. The mere falling of a tree in the bed of a stream, may form a bar, then an island, and, thus, may shift the entire channel.

The first settlers along the Mississippi found, therefore, rich lands, annually (or nearly so) overflowed by the river. They found, besides, on both banks of the stream, from Red River and Baton Rouge to the Gulf, numerous outlets, by which the waters were carried laterally to the sea. Everywhere, except in these outlets, the waters, barely to the depth of a few inches, passed over the banks of the river. Since then, nature has been at work and man has been at work. Let us see if we can determine what nature has done.

There is no doubt that had man never interfered with the Mississippi, it would have continued to flow as explained above, forming new soil at its mouth, and elevating the surface of land previously made. There is no doubt, also, that many and extensive changes would have been brought about along its entire course. The topography of the country shows, conclusively, that the present bed of the river is not the one it has always occupied; that this bed has shifted time and time



again. There is also one indisputable conclusion—that the river has changed its regimen from time to time. We are also struck with the fact that its current increases as we leave the gulf, and that the channel becomes more and more tortuous as the current increases. As it assumed a more tortuous condition, it naturally deepened its bends, and often these bends, breaking through the narrow necks which separated them, cut-offs were made, the old channel was filled at each extremity, and lakes, false rivers, etc., formed. To these natural changes add the elevation of the bed of the river, as explained before, and we have the extent of the workings of nature.

Now, what has man done? Paradoxical as it may appear, he has done *too much*, and *too little*. He has had no foresight, and he has worked without having or entertaining a proper view of the consequence of his works. Taking the Mississippi, and its alluvial lands, as we find them, as above explained, let us proceed. The first settlers on the banks of the river found that they were periodically subject to overflows. They found that by throwing up a small dike in front of their settlements they protected themselves from these overflows; because the waters, on account of the inclination of the land perpendicularly to the line of the river, were carried off on either side of their habitations. Adopting this as a proper system, they resorted to it everywhere. The French engineer, De la Tour, traced out the city of New Orleans, under the orders of Bienville, in 1717, and recommended a dike for its protection. In 1727, this levee is reported completed. Below New Orleans, and above, the leveeing system is continued, and, by 1770, we have a levee from the English Turn to more than fifty miles above. But it is not necessary to trace out the history of levees along the Mississippi. It is sufficient to remember that levees were gradually built along the banks of the Mississippi, cutting off the waters from their natural lateral flow over the lands, and, through innumerable outlets, up as high as Baton Rouge and Red River, with the exception of Bayou Lafourche, Bayou Plaquemine, and the Atchafalaya. Above Red River and Baton Rouge levees have been built, or are being built, so as to exclude the Mississippi waters from all the large districts of flat lands previously mentioned in this Report, and which are to the number of eighteen. Not only individual enterprise, but the combined efforts of States, have been applied to this stupendous work.

Through the beneficial aid of the United States Government, all the States (Louisiana included) who possess lands of Mississippi formation, are now engaged in building levees, and very soon there will be a line of levees from the gulf to the Big and Little chains of the Mississippi.

Let us now consider how levees have affected the river, and interfered with its natural regimen. It is evident that with every foot of levee built up there was a proportionate volume of water confined to the bed of the river, and, consequently, an interference with its regimen. A still greater effect was produced by the closing of outlets. As we gradually confined these waters, we necessarily raised the surface of the river, and at every step in the construction of levees and dykes, we found the necessity of building them larger and higher. So that now, in places where there was sufficient protection afforded by levees of one or two feet in height, we require levees of six, seven, or eight feet. Another consequence of the confining of the waters is, that we thus have increased the current, and by causing the river to advance more rapidly in the gulf than it naturally would have done, have elevated its bed in a like proportion. The gulf has, however, resisted this artificial encroachment upon it, and to such a degree as to force the river to seek its regimen by slightly widening, in a few localities, its bed, and especially by increasing its length. In fact, the Mississippi is now more tortuous than it ever was, and will continue to become more and more so. I have said that as we recede from the sea the stronger is the current; another fact is, that as we recede from the sea the more winding is the stream. Is it not, then, evident, that as we increase the current we lengthen the river? We are also forced to the conclusion, that nowhere has the Mississippi deepened its channel, although, by confining its waters, and by making, at times, cut-offs, we have increased the force of its current. The Po, in Italy, once ran between low, natural banks, as did the Mississippi. Small levees were built at first, and proved sufficient; and as the Po was controlable by man, it was confined to one almost invariable channel. Did this channel deepen? No; it has filled up; and now its bottom is as high as the soil which the waters at first merely covered. Had not the Mississippi been uncontrollable, and had it not sought to resume its natural regimen, by yearly breaking through our feeble barriers, and particularly by lengthening its

course, our levees would even now have reached the height of fifteen feet in lower Louisiana. Our salvation has been, that we have not done all that we intended to do—that the Great River has rendered null some of our efforts to seek our own destruction. *Let us, therefore, hear no more of the scouring out, by the force of the current, of a deeper channel for the Mississippi.*

Without going further into remarks or arguments, we conclude, then, that man has built up levees and closed outlets, to the extent of confining the Mississippi to its channel, (or will very soon,) throughout its course from the sea to the Big and Little Chain. Now it must be recollected, that the amount of lowlands thus rescued from overflow, is about 40,000 square miles. Of these lands, all above Red River and Baton Rouge, acted by districts, as immense reservoirs, in which the surplus waters collected at time of floods, to be there retained until the river began to subside. Below Baton Rouge and Red River, every drop of water that left the river left it altogether, and, flowing seaward, gave room for the escape of more. We can thus see how it is that the river, in its natural condition, could never overflow its banks to more than a few inches, and how it is that we see it now many feet above those same banks.

Another effect of man's labors must here be noticed. He has cleared the lands of their natural growth, and has brought them into cultivation. One effect of this has certainly been to increase the amount of evaporation of the water that falls upon these lands by rains and snows : but another counter-effect is, that every drop of that water has been facilitated in its course to the sea. Every farmer has his ditches, drains, &c., so that the water, which once remained on his lands in a virgin state several days, is now rushed off in a couple of hours. Again, for cultivation and drainage, and, in many important instances, for navigation, creeks, bayous, rivers, have been cleared out, and now bring down their waters in much less time than they did naturally.

And we must remember, that in the matter of cultivation, and clearing out of streams, we must not look to the delta of the Mississippi only, but also to the thousand of its tributaries, and the thousand and thousand tributaries of these last. A drop of water artificially hurried into the Ohio, at Pittsburg, or one so hurried into the Missouri, at the foot of the Rocky Mountains, contributes to the overflow of our lands in Louisiana.

To sum up, then, we see that, by artificial means, we have interfered with the Mississippi :

*First*, By the building of levees, and the closing of outlets.

*Second*, By the cultivation and drainage of lands, and by improvements of streams for drainage and navigation.

*Third*, By making cut-offs between bends of the river.

And we see that all our labors are the direct causes of the evils under which we suffer. In our greediness to rob the Mississippi of its rich soils, we have taken no precaution to protect ourselves from its wrath ; but on the contrary, have gone on to outrage it still more and more. We should have steadily kept in view that we were seeking the reclamation of lands, and, at the same time, increased their liability to overflow. We should have kept in mind that, as we confined the great river at one point, we should have given it artificially easier exit elsewhere. It is true that we have been allowed to confine it, to a certain extent, without danger. Until 1828, it never admonished us that we were going too far. Up to that time, we were comparatively left in security. Since that time, repeatedly have we been punished for forgetting a part of our duty. We conclude, then, that the more we build levees, and close reservoirs and outlets, the more we expose ourselves. We should have stopped somewhere in our reclamation of lands, or else have applied means to counteract the influence of our own works upon the rises of the river. Thus we have done too much in one way, and not enough in the other.

Now let us consider the position of the State of Louisiana, making application of all that has gone before. In Mississippi, Arkansas and Missouri, and in Louisiana, above Baton Rouge and Red River, we have noticed that all the alluvial lands have been but acting as reservoirs, having the river itself as their drain.

It is easy to see that there is but one way of reclaiming these lands ; viz : the building of levees. These are being built, and very rapidly, either by individual enterprise, or by State efforts.

Here, then, unless some of those districts are reserved as reservoirs, there is no means of counteracting the bad effects of the levees which reclaim their lands ; and we must suppose that all the waters which once filled those districts must be ultimately precipitated upon lower Louisiana. We see, therefore, that lower Louisiana must not

only prepare for the increased rise of the river due to her own levees, but for that due to the works along the entire valley.

Her position offers certainly no cheering prospects, but rather threatens complete destruction. The question is, *What is to be done?*

We have seen that we could work with impunity to a certain fixed point, and that when we passed beyond it we were punished.

Therefore, to answer the question we must go back to that point. It must be admitted that it is only the surplus waters of the Mississippi that we must find how to dispose of. Here, then, is the problem to be solved. The solution is evident.

*We must give vent to the surplus waters.* Of course not by tearing down all our levees; but, I say, by tearing down *some* of them. That is, we must endeavor to give outlets to the Mississippi, which will reduce its surface to such a degree that we can control its remaining floods. We have now, as remaining outlets, the Lafourche, the Plaquemine, and the Atchafalaya. These, in the first place, should be made to take off more waters. This can be done by clearing out their channels of all obstructions, and in some instances, by straightening those channels. If we should do nothing else, let us at least preserve those outlets.

And here I must be allowed to digress a little, and notice a move which is being made to prevail upon your honorable bodies, to close the Plaquemine. We have but three remaining outlets; the Atchafalaya is the most important; next, the Plaquemine, and thirdly, the Lafourche. So we see that the higher up the outlets takes the waters the more it carries off. The total discharge of the Plaquemine has been calculated to be about 28,500 feet per second of time during the high water of 1851. Throw suddenly this quantity of water in the Mississippi below, and what devastation and ruin may occur? Independently of the preservation of an outlet here, ought we not to take warning of the past, and profit by our experience, so sadly taught by the great injuries done when we have caused a sudden change of the regimen of the river? Let us remember the Raccourci Cut-off.

Therefore, *close not the Plaquemine.*

To return. We should not only preserve the existing outlets, but we should go to work and make new ones. And here arises a question. When an outlet is closed, lands are reclaimed. Yes; but, as we have

seen, the danger of overflow is increased. The estimated escape of waters between Red River and a point eleven miles below New Orleans, by crevasses in 1851, (independent of outlets,) was 100,800 cubic feet per second. Imagine, then, if the Plaquemine and Lafourche had been closed, and if all the levees had resisted, to what height the river would have risen. So in 1851, even with our present outlets, 100,000 cubic feet of water, or more, were vented by crevasses in lower Louisiana. Of course these spread desolation and ruin over large districts. Does not this point out the course we should follow? Does it not tell us plainly that we should sacrifice some of our lands for the security of the great body of them? It does, most assuredly. As I have said before, we have been too greedy; we want the whole, when we should leave a part. The proper course is, therefore, to choose out what lands we should sacrifice, and make through them the outlets the Mississippi calls for so imperatively. By making these outlets ourselves, we can do so to our advantage, and control them.

Such, gentlemen of the Senate and House of Representatives, are my views, respectfully submitted, concerning the Mississippi.

I fear I have not done justice to the subject, even in this lengthened Report, written, perhaps, in a very disconnected manner. I would, in termination of the subject, *strongly recommend the outlet system*. Because the Mississippi has left us in quiet for some years now, we must not forget that one of its floods may injure us suddenly to the amount of millions; and we should keep constantly in mind, that when that flood comes it will be greater than ever.

To establish where and how new outlets ought to be made, requires the survey of the State recommended in the first part of this Report.

Relative to the other matters called for by the Joint Resolution to which this Report is an answer, it is of course unnecessary to say anything here. They will be attended to, should you adopt now the recommendations of this Report.

I have spoken, thus far, of the lands inundated by the Mississippi. I shall be pardoned if I express briefly my ideas respecting the wants of others. During a great portion of the year when our streams are low, many sections of our State are cut off from market.

This has been seriously the case in the district above Red River, in the Red River Valley, along the Boeuf, and elsewhere. There is no

resource, in such cases, but to build railroads. Let us improve our streams, because, when it can be obtained, water transportation is the cheapest; but when we cannot get this, let us have railroads. The Red River Valley wants, and must have, a railroad. I would then deem it right to encourage the construction of such roads by all the means allowed by the Constitution of the State.

To sum up my recommendations, I would say that I advise,

*First, A survey of the State*, and would add that the seat of Government, as recommended by the Swamp Land Commissioner of the First District, in his last Report, be made the initial point of said survey.

*Second, The continuation, with slight modifications, and increased means, of the present State Engineer's department.*

*Third, The improvement of existing outlets, and the making of new ones*, for the escape of the surplus waters of the Mississippi; the new outlets to be laid out according to the above survey.

*Fourth, The encouragement of railroads.*

It may be observed that what I recommend will cost perhaps millions. It may be so, but we have been expending thousands and thousands without any benefits whatever. Let us spend millions and reap benefits; let us do what other States have done. New York thinks nothing of twenty-five millions of dollars to enlarge the Erie Canal.

I may here be allowed to make an additional recommendation. The Mississippi River, in my humble opinion, should be considered as an inland sea, and its improvement should appertain to the General Government. I am happy to see that our able Senator, Mr. J. P. Benjamin, takes this view, and that he has lately called the attention of Congress to the matter. It is hard for Louisiana to have to suffer from the works prosecuted by her sister States of the valley of the Mississippi, and to be left to her sole resources against the accumulation of evils thrown upon her.

I would therefore recommend that your honorable bodies request of our members in Congress to exert their influence to cause the Mississippi to be recognized as a national stream. The General Government should also be strongly urged to remove the obstructions placed in the Bayou Lafourche, under orders of General Jackson, in 1814. This Louisiana has a right to demand. It is but little for the



United States to give, and it is a great deal for Louisiana to receive, in her present position.

All of which is most respectfully submitted,

LOUIS HEBERT, *State Engineer.*

BATON ROUGE, LA., *January 31st, 1857.*